UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,776	06/30/2003	Kei Yamamoto	204552028900	8129

7590 03/30/2010

Barry E. Bretschneider
Morrison & Foerster LLP
Suite 300
1650 Tysons Boulevard
McLean, VA 22102

EXAMINER	
FORDE, DELMA ROSA	
ART UNIT	PAPER NUMBER
2828	

MAIL DATE	DELIVERY MODE
03/30/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/608,776	YAMAMOTO ET AL.	
	Examiner	Art Unit	
	DELMA R. FORDE	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 December 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,8-22 and 24-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *9-22* is/are allowed.

6)☒ Claim(s) *1-5,8 and 26* is/are rejected.

7)☒ Claim(s) *24 and 25* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

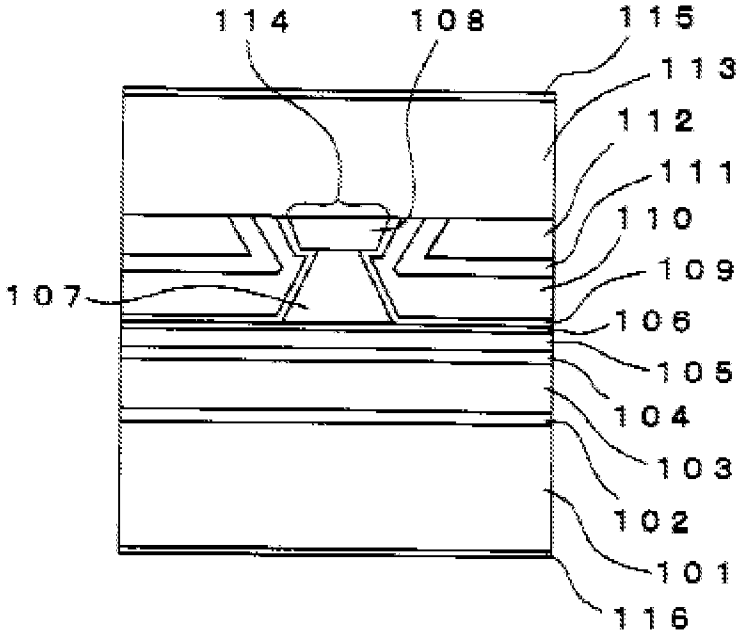
> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1 – 5, 8 and 24 - 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumoto (2003/0016712) in view of Andrea Oster, et al. "Gain spectra measurement of strained and strain-compensated InGaAsP-AlGaAs Laser structure for $\lambda \approx 800$ nm" further in view of Fukunaga et al (6,127,691).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the

application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Matsumoto '712



Regarding claims 1, 5 and 8, Matsumoto discloses semiconductor laser device having at least a lower clad layer (see Figure 1, Characters 103), lower guide layer (Paragraph [0100]), an active region (see Figure 1, Character 104), upper guide layer Paragraph [0100]), and a upper clad layer (see Figure 1, Characters 105 and 107 Paragraph [0068]) are supported by GaAs substrate (see Figure 1, Character 101), the active region having a quantum well (Paragraphs [0099 and 0100]) structure in which one or more well layers and barrier layers (Paragraphs [0099 and 0100]) are stacked, wherein one or more barrier layers are formed of InGaAsP (Paragraphs [0099 and

0100]) said semiconductor laser device further comprises a GaAs etching stop layer (see Figure 1, Character 106, Paragraph [0068, 000071 – 0072]), and said upper clad layer (see Figure 1, Characters 105 and 107, Paragraph [0068]) comprises an AlGaAs first upper clad layer (see Figure 1, Characters 103, Paragraph [0068]) and an AlGaAs second upper clad layer (see Figure 1, Character 107) with the GaAs etching stop layer (see Figure 1, Character 106) therebetween, said AlGaAs second upper clad layer (see Figure 1, Character 107) defining a ridge stripe (see Figure , Character 114, Paragraphs [0068 and 0069]).

TABLE II
CHARACTERISTIC DATA FROM PULSED BA LASER MEASUREMENT
(PULSE LENGTH: 500 ns, DUTY CYCLE: 1:400)

Sample	A	B	C	D
η_{SW} (%)	0.1	0.6	1.0	1.0
η_R (%)	-	-	-	-1.0
λ (nm)	796	808	791	797
η_i (%)	75	79	77	92
α_i (cm^{-1})	≈1	≈1	≈1	≈1
j_0 (A cm^{-2})	200	128	150	137
$\Gamma \cdot G_0$	18.5	14	19	18

Matsumoto discloses the claimed invention except for an oscillation wavelength of larger than 760nm and smaller than 800nm. Oster teaches an oscillation wavelength of larger than 760nm and smaller than 800nm. However, it is well known in the art to apply the oscillation wavelength of larger than 760nm and smaller than 800nm as discloses by Oster in (abstract, and page 632 Table II and the first paragraph of “BA Lasers”). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was to apply the well known an oscillation wavelength of larger than 760nm and smaller than 800nm as suggested by Oster to the laser of

Matsumoto, because it would be provide a high power semiconductor laser device with low threshold current.

TABLE I
LAYER SEQUENCE OF LASER STRUCTURES UNDER INVESTIGATION

layer		composition	thickness (nm)
contact		p-GaAs	
cladding		p-$Al_{0.7}Ga_{0.3}As$	1800
waveguide		p-$Al_{0.4}Ga_{0.6}As$ $Al_{0.6}Ga_{0.4}As \rightarrow Al_{0.4}Ga_{0.6}As$	500 10
active region	A	$In_{0.16}Ga_{0.84}As_{0.73}P_{0.27}$	18
	B	$In_{0.28}Ga_{0.72}As_{0.6}P_{0.4}$	13
	C	$In_{0.28}Ga_{0.72}As_{0.73}P_{0.27}$	5
	D	$GaAs_{0.73}P_{0.27}$ $In_{0.28}Ga_{0.72}As_{0.73}P_{0.27}$ $GaAs_{0.73}P_{0.27}$	5 5 5
waveguide		$Al_{0.4}Ga_{0.6}As \rightarrow Al_{0.4}Ga_{0.6}As$ n-$Al_{0.4}Ga_{0.6}As$	10 500
cladding		n-$Al_{0.7}Ga_{0.3}As$	2000
buffer		n-GaAs	
substrate		n-GaAs	

Matsumoto discloses the claimed invention except for one or more well layers are formed of InGaAsP. Oster teaches one or more well layers are formed of InGaAsP. However, it is well known in the art to apply the one or more well layers are formed of InGaAsP as discloses by Oster in (see section II. Experimental A. Samples Preparation, first paragraph on page 631 and Table I, active region section D on page 632) Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was to apply the well known one or more well layers are formed of InGaAsP as suggested by Oster to the laser of Matsumoto, because the material (InGaAsP) allows this laser wavelength to be realized with compressively stained,

tensile-strained or strain-compensated QW's, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Matsumoto discloses the claimed invention except for one or more well layers are compressive strained and said barrier layers are tensile strained. Oster teaches one or more well layers are compressive strained and said barrier layers are tensile strained. However, it is well known in the art to apply the one or more well layers are compressive strained and said barrier layers are tensile strained as discloses by Oster in (Abstract, I. Introduction section first paragraph and II. Experimental section, first paragraph on page 631). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was to apply the well known one or more well layers are compressive strained and said barrier layers are tensile strained as suggested by Oster to the laser of Matsumoto, because it would be provides the device performance, (e. g. For highly strained (1%) QW's stain compensation by tensile strained barrier improves the device preference, a laser with QW's with strain compensation show a 10% higher differential efficiency in comparison to structures without strain compensation, see abstract).

Matsumoto discloses the claimed invention except for upper and/or lower guide is formed of $Al_zGa_{1-z}As$ ($0.20<z<1$). Oster teaches upper and/or lower guide is formed of $Al_zGa_{1-z}As$ ($0.20<z<1$). However, it is well known in the art to apply the upper and/or lower guide is formed of $Al_zGa_{1-z}As$ ($0.20<z<1$) as discloses by Oster in see table I on page 632. Therefore, it would have been obvious to a person having ordinary skill in

the art at the time the invention was to apply the well known upper and/or lower guide is formed of $Al_zGa_{1-z}As$ ($0.20<z<1$) as suggested by Oster to the laser of Matsumoto, because guiding the light in the laser (e.g. for restricting the spatial region in with light can propagate), since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Matsumoto discloses the claimed invention except for barrier layers are formed of InGaAnP and the barrier layers having band gap energy larger than that of said one or more well layer. However, it is well know in the art to apply the barrier layers are formed of InGaAnP and the barrier layers having band as discloses by Matsumoto Figure 6, character 304, Paragraphs [0090 and 0100]. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was to apply the well known the barrier layers are formed of InGaAnP and the barrier layers having band gap energy larger than that of said one or more well layer as suggested Matsumoto, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Regarding claims 2 and 5, Oster discloses a value of z representing a mole fraction of Al in the group III element of said upper and/or lower guide layer is larger than 0.25 (see Table I on page 632), a value of z, where a value of z represents a mole fraction of A1 in the group-III elements of said upper and/or lower guide layer, of at least

a portion in contact with a barrier layer of said upper and/or lower guide layer is smaller than 0.4. (See Table I on page 632).

Regarding claims 3, and 4, Oster discloses a upper and lower cladding (see Table I on page 632) contain Al, and a value of z, wherein a value of z represent a mole fraction of Al in the group-III elements of said upper and/or lower guide layer, is smaller than a value of an Al mole fraction of said upper and lower clad layer and the value of z varies stepwise or continuously and is such a fashion as to increase with increasing nearness to said upper and lower clad layers (see Table I on page 632).

Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Andrea Oster, et al. "Gain spectra measurement of strained and strain-compensated InGaAsP-AlGaAs Laser structure for $\lambda \approx 800$ nm" in view of Fukunaga et al (6,127,691).

Regarding claim 26, Oster (Examiners includes Tables I and II) discloses semiconductor laser device having an oscillation wavelength of larger than 760nm and smaller than 800nm (see abstract and page 635 Table II and first paragraph of "BA Lasers") in which at least a lower clad layer (see Table I on page 632) a lower guide layer (see Table I on page 632, the reference call "waveguide"), an active region (see Table I on page 632) and upper guide layer (see Table I on page 632and an upper clad layer (see Table I on page 632) are supported by GaAs substrate (see Table I on page

632), the active region having a quantum well (see Table I on page 632) structure in which one or more well layers and barrier layers (see Table I on page 632) are stacked, wherein one or more well layers are formed of InGaAsP (see Table I on page 632) and said upper and/or lower guide layer is formed of $Al_zGa_{1-z}As$ ($0.20<z<1$) (see Table I on page 632), said one or more well layers are compressive strained and said barrier layers are tensile strained (page 631, abstract, I. Introduction section first paragraph and II. Experimental section, first paragraph), each of the $Al_zGa_{1-z}As$ upper and/or lower guide layers (see Table I on page 632, the reference call "waveguide") interfaces with an adjacent tensile strained barrier layer (see Table I on page 632), and upper and lower surfaces of each of the one or more well layers interfaces with an adjacent tensile strained barrier layer (see Table I on page 632).

Oster do not explicitly discloses conduction-energy band difference $|\Delta Ec|$ between said upper and/or lower guide layer and said one or more well layers is greater than or equal to 0.2 eV. However, it was shown above that Oster teach $Al_zGa_{1-z}As$ upper and/or lower guide layers and InGaAsP well layer for the semiconductor laser. These materials will inherently have conduction-energy band difference $|\Delta Ec|$ between said upper and/or lower guide layer and said one or more well layers is greater than or equal to 0.2 eV as claimed and therefore these limitations are taught by Oster.

Oster discloses the claimed invention except for barrier layers are formed of InGaAnP and the barrier layers having band gap energy larger than that of said one or more well layer. Fukunaga teaches barrier layers are formed of InGaAnP. However, it is well know in the art to apply the barrier layers are formed of InGaAnP and the barrier

layers having band gap energy larger than that of said one or more well layer as discloses by Fukunaga in abstract, Column 3, Lines 35 – 45, Column 5, Lines 60 – 67 and Column 6, Lines 1 – 12. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was to apply the well known the barrier layers are formed of InGaAnP and the barrier layers having band gap energy larger than that of said one or more well layer as suggested by Fukunaga to the laser of Oster, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Allowable Subject Matter

Claims 9 – 22 are allowed.

The following is an examiner's statement of reasons for allowance: Claim 9 recites a semiconductor laser structure including the specific structure limitation of barrier layer are formed of an $In_{1-x}Ga_x As_{1-y}P_y$ having a band gap energy larger than that of said well layers, and there hold relationship that $0 < x < 1$; $0.02 < y < 0.75$ and $|(a2 – a1) / a1| * 100$ 0.65, where a1 is lattice constant of said one or more well layers, and a2 is lattice constant of said barrier layers, which is neither anticipated or disclosed nor suggested in any piece of available prior art, which is neither anticipated nor obvious over the prior art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Claims 24 and 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 24 recites a semiconductor laser structure including the specific structure limitation of *a current block layer provided along the GaAs etching stop layer on opposite sides of the AlGaAs second upper clad layer and a GaAs buried protective layer provided on the opposite sides of the GaAs protective layer, with a part of the current block layer disposed between the GaAs protective layer and the GaAs buried protective layer, and with top surfaces of the GaAs protective layer, the GaAs buried protective layer, and the part of the current block layer being flush with each other*, which is neither anticipated or disclosed nor suggested in any piece of available prior art, which is neither anticipated nor obvious over the prior art of record.

Response to Arguments

Applicant's arguments with respect to claims 1 – 5, 8 – 22 and 24 - 26 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DELMA R. FORDE whose telephone number is (571)272-1940. The examiner can normally be reached on M-T.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MinSun O. Harvey can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Delma R. Fordé/
Examiner, Art Unit 2828
March 25, 2010

/Minsun Harvey/
Supervisory Patent Examiner, Art Unit 2828